CLAIMS

1. A power supply device comprising:

a capacitor unit in which capacitors are interconnected in series or in series-parallel;

a charging unit for charging the capacitor unit at a constant current;

a detecting unit for detecting voltage on a high potential side of each of the capacitors;

a determining unit for determining existence of an abnormality based on the voltage detected by the detecting unit; and

a communication unit for outputting a determining result from the determining unit,

wherein the determining unit determines the abnormality when difference between respective voltages on the high potential sides of adjacent capacitors in the capacitors exceeds an upper-limit voltage, when the difference is lower than a lower-limit voltage, or when a voltage value is negative.

2. The power supply device according to claim 1,

wherein the upper-limit voltage is set as a withstand voltage value per one cell of the capacitors.

3. The power supply device according to claim 1,

wherein lower-limit voltage value "Vb" is expressed by

$$Vb = Vc / (2N),$$

where "Vc" is a charge voltage value of the capacitor unit and "N" is series number of the capacitors.

4. The power supply device according to claim 1,

wherein the determination is started at the time when a charge voltage value of the capacitor unit is at most a predetermined voltage value.

5. The power supply device according to claim 4,

wherein the predetermined voltage value, "Vd" is expressed by

$$Vd = Vt \times \{ 1 + (N - 1 - M) \times (1 - dev) / (1 + dev) \} - \alpha,$$

where "Vt" is a withstand voltage value per one cell of the capacitors, "dev" is a capacity variation of the capacitors, "N" is the total number of the capacitors, "M" is the number of series stages including short-failed capacitors, and "α" is a detection error margin.